

Appn. No. 10/551,728
Response dated September 17, 2007
Reply to Office Action of May 9, 2007

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Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A method for preparing ~~an a porous~~ acicular mullite composition, the method comprising,

a) forming a mixture of one or more precursor compounds having the elements present in mullite and a property enhancing compound, the property enhancing compound containing an element selected from the group consisting of Mg, Cu, Fe, Na, K, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, B, Y, Sc, La and combination thereof, wherein the Al/Si ratio of the mixture is less than 3.1.

b) shaping the mixture into a porous green shape,

c) heating the porous green shape of step (b) under an atmosphere having a fluorine containing gas and to a temperature sufficient to form a mullite composition having a porosity of about 40% to 85% that is comprised substantially of acicular mullite grains that are essentially chemically bound.

2. (currently amended) The method of Claim 1 wherein ~~the precursor compounds are clay and another compound selected from the group consisting of alumina, silica, fluorotepaz, zeolite, AlP, and mixtures thereof~~ Al/Si ratio is at most about 3.05.

3. (currently amended) The method of Claim 2 wherein ~~the other precursor compounds are selected from the group consisting of alumina, silica, fluorotepaz, zeolite, and mixtures thereof~~ the Al/Si ratio is at most 3.

4. (original) The method of Claim 1 wherein the precursor compounds are alumina, silica and clay.

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5. (currently amended) The method of Claim 1 wherein the fluorine containing gas is SiF₄ separately provided ratio is about 2.95 to about 2.2.

6. (currently amended) The A method for preparing a porous acicular mullite composition, the method comprising,

a) forming a mixture of one or more precursor compounds having the elements present in mullite and a property enhancing compound comprising talc,

b) shaping the mixture into a porous green shape,

c) heating the porous green shape of step (b) under an atmosphere having a fluorine containing gas and to a temperature sufficient to form a mullite composition comprised substantially of acicular mullite grains that are essentially chemically bound of Claim 1 wherein the property enhancing compound is an oxide, acetate, carbonate or nitrate.

7. (currently amended) The method of Claim 4-6 wherein the property enhancing compound is talc.

8. (currently amended) The A method for preparing a porous acicular mullite composition, the method comprising,

a) forming a mixture of one or more precursor compounds having the elements present in mullite and a property enhancing compound, wherein the property enhancing compound is comprised of a first property enhancing compound having an element selected from the group consisting of Ce, B, Fe and Nd, and a second property enhancing compound having an element selected from the group consisting of Mg, Ca, Pr, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, Sc, La and combination thereof,

b) shaping the mixture into a porous green shape,

c) heating the porous green shape of step (b) under an atmosphere having a fluorine containing gas and to a temperature sufficient to form a mullite

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composition having a porosity of about 40% to 85% that is comprised substantially of acicular mullite grains that are essentially chemically bound.

9. (currently amended) The method of Claim 4-8 wherein the element of the second property enhancing compound is Mg, Ca, Y or combination thereof.

10. (currently amended) The method of Claim 4-9 wherein the element is selected from the group consisting of B, Y, Ce, Nd and combination thereof first and second property enhancing compound are selected from the group consisting of oxides, nitrates, acetates and combinations thereof.

11. (currently amended) A method for preparing a porous acicular mullite composition, the method comprising,

a) forming a mixture of one or more precursor compounds having the elements present in mullite and a property enhancing compound, the property enhancing compound containing an element selected from the group consisting of Mg, Ca, Fe, Na, K, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, B, Y, Sc, La and combination thereof.

b) shaping the mixture into a porous green shape,

c) heating the porous green shape of step (b) under an atmosphere having a fluorine containing gas and to a temperature sufficient to form a mullite composition is comprised substantially of acicular mullite grains that are essentially chemically bound. The method of Claim 1 wherein the element is Nd and Mg such that and said mullite composition has a the ratio of Nd/Mg in the mullite composition is from about 0.1 to about 10 by weight.

12. (currently amended) A method for preparing a porous acicular mullite composition, the method comprising,

a) forming a mixture of one or more precursor compounds having the elements present in mullite and a property enhancing compound, the property enhancing compound containing an element selected from the group consisting of Mg,

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Ca, Fe, Na, K, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, B, Y, Sc, La and combination thereof, wherein the property enhancing compound is added in an amount of at most about 5% by volume of the mixture.

b) shaping the mixture into a porous green shape.

c) heating the porous green shape of step (b) under an atmosphere having a fluorine containing gas and to a temperature sufficient to form a mullite composition having a porosity of about 40% to 85% that is comprised substantially of acicular mullite grains that are essentially chemically bound. The method of Claim 1 wherein the heating of step (c) is to a first temperature and then to a second higher temperature wherein fluorotopaz is formed at the first temperature and the mullite is formed at the second higher temperature.

13. (currently amended) The method of Claim 12 wherein the fluorotopaz formed at the first temperature is formed in an atmosphere comprised of SiF₄ separately provided property enhancing compound amount is at most about 2% by volume of the mixture.

14. (currently amended) The method of Claim 13 wherein the first temperature is from about 500°C to about 950°C the mixture has an Al/Si ratio of less than 3.1.

15. (currently amended) The method of Claim 14 wherein the mixture has an Al/Si ratio of at most about than 3.0 the first temperature is at least 650°C to about 750°C.

16. (currently amended) The method of Claim 13 wherein the mixture has an Al/Si ratio of at most about than 3.0 the second temperature is at least about 960°C to at most about 1300°C.

Claims 17-30 are cancelled.

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31. (currently amended) The method of Claim 4-16 wherein the mixture has an Al/Si ratio of at most about than 2.95 the element is Fe and Mg such that the ratio of Fe/Mg in the mullite composition is from about 0.5 to 1.5.

32. (new) The method of Claim 31, wherein the mixture has an Al/Si ratio of at least about 2.2.

33. (new) A method for preparing a porous acicular mullite composition, the method comprising,

a) forming a mixture of one or more precursor compounds having the elements present in mullite and a property enhancing compound, the property enhancing compound containing an element selected from the group consisting of Mg, Ca, Fe, Na, K, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, B, Y, Sc, La and combination thereof.

b) shaping the mixture into a porous green shape,

c) heating the porous green shape of step (b) under an atmosphere having a fluorine containing gas and to a temperature sufficient to form a mullite composition comprised substantially of acicular mullite grains that are essentially chemically bound and said mullite composition having a porosity of about 40% to 85% that has a ratio of Fe/Mg from about 0.5 to about 1.5 by weight the Fe and Mg being present as oxides.

34. (new) The method of Claim 33, wherein the Fe and Mg are present in an amorphous oxide glassy phase.